



ReMI

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Reliability in
Mechatronics and ICT

dr. ing. Jeroen Boydens



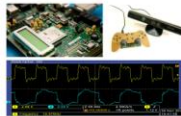
ReMI: Reliability in Mechatronics and ICT

ECOREA



Electronic Circuit Design And Realization

- Analog and Digital signal processing
- Algorithm development
- FPGA & DSP Implementations



» Visit the ECorea website

EP



Enterprise Programming

- Concurrent software (MultiCore)
- Embedded software development
- Software testing
- Design patterns
- Software for smart phones



» Visit the EP website

EMAS



Electric Machines

- Power electronics & Automation
- Power Quality (EMC)
- Efficiency & Productivity
- Reliable Networking
- Renewable Energy



» Visit the EMAS website

FMEC



Flanders Mechatronics Engineering Centre

- EMC & Signal Integrity
- overall reliability
- Thermal & Mechanical behavior
- Highly Accelerated Lifetime Testing



» Visit the FMEC website

ReMI – EP

contact: Jeroen.Boydens@kuleuven.be

- Concurrent Software (MultiCore)
- Embedded Software Development
- Software Testing
- Design Patterns

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Research Projects->Pitch P. Cordemans

TDD4ES research overview

Literature study

Icon	Rating	Title
	4	Design Patterns: Elements of Reusable Object-Oriented Software

Workshop



Manual



MC4ES research overview

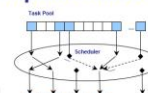
Design patterns

- Thread Pool Pattern
- Map/Reduce
- Loop parallelism
- Planar Pattern

Testing

- Nonatomic operations
- Two-stage access bug pattern
- Wrong lock or no lock
- Double-checked locking
- A "blocking" critical section
- The sleep() bug

Implementation



Tools

- Performance
- Safety
- Debugging
- Etc.

Project Proposal: Real-Life Immunity

Literature study



Case studies



Manual

Seminar: 28/11/2013
Embedded software quality:
opportunities & pitfalls

CMS

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Project Proposal ReMI FMEC-EP Issues With Current Immunity Testing

- all test methods start from the assumption that source of the EM disturbance is far from the possible victim, but EM environment has changed a lot over the last years!!



Find the electronic products....

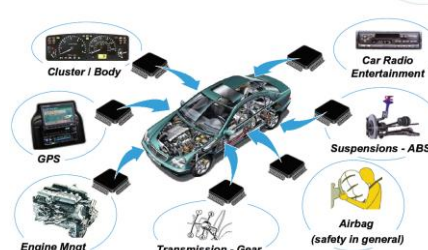
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Modern EM Environment



Intra-system EMI (embedded systems) is becoming more important!

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Project Proposal Real-Life Immunity

Looking for industrial partners

- Real-Life Immunity - 2 parallel tracks
 - Hardware track leading to improved testing and design rules
 - To be used while designing embedded hardware
 - Counters possible EMC-attacks
 - Leading partner Davy.Pissoort@KULeuven.be
 - Software track leading to immunity-aware software
 - To be used while designing, refactoring and re-engineering embedded software
 - Counters possible EMC-attacks not solvable in hardware or when hardware is already produced
 - Leading partner Jeroen.Boydens@KULeuven.be
- See project overview, come to me.

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- EMC & Signal Integrity
- Overall Reliability
- Thermal & Mechanical Behavior
- Highly Accelerated Lifetime Testing

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Electro-Magnetic Compatibility

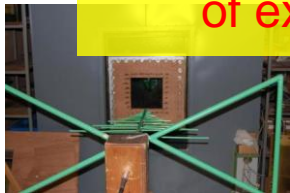


In-house measurements



In-situ measurements

More than 25 years
of experience !



Shielding-Effectiveness Materials



Short Courses/Seminars

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Environmental Testing



HALT-testing



Climate Chamber
+ shaker

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Research Projects



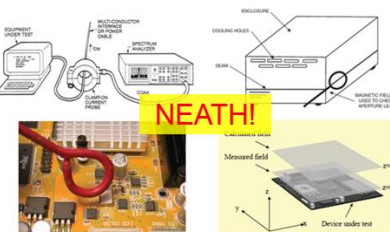
DfX-Bridge

Multidisciplinair ontwerp van elektronische modules op PBA niveau, brug tussen theorie en praktijk

Tetra-aanvraag 2009-2010

KHBO – K.U. Leuven – imec

FMEG



NEATH!

Measured field

Device under test

2. VIS-PROSPERITA

Productverbetering dankzij Ontwerp- en Specificatierichtlijnen voor Elektronica Realisatie en Integratie gebaseerd op Fysische modellering
(Product improvement through design and specification guidelines for realization of electronics and integration, based on physical modelling)

Goal:

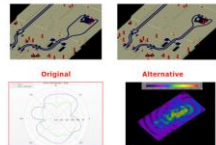
Design-for-X guidelines to design, manufacture and integrate cost effective PBA's with controlled quality and reliability, aiming for competitive electronic based products and systems on the international market in a cost effective manner and with a short time-to-market.

The DfX Guidelines consist of two groups:

- **Design-for-Manufacturing** guidelines focus on cost effective manufacturing of PBA's with controlled quality and reliability.
- **Integration** guidelines focus on the correct installation of the PBA in a system and the impact of the load conditions of the system onto the PBA(s).

Virtual Mobile Antenna/EMI lab

FMEG **NVIDIA** **Agilent Technologies**



Original Alternative

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ReMI - EMAS

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- Power Quality (EMC)
- Efficiency & Productivity
- Reliable Networking
- Renewable Energy

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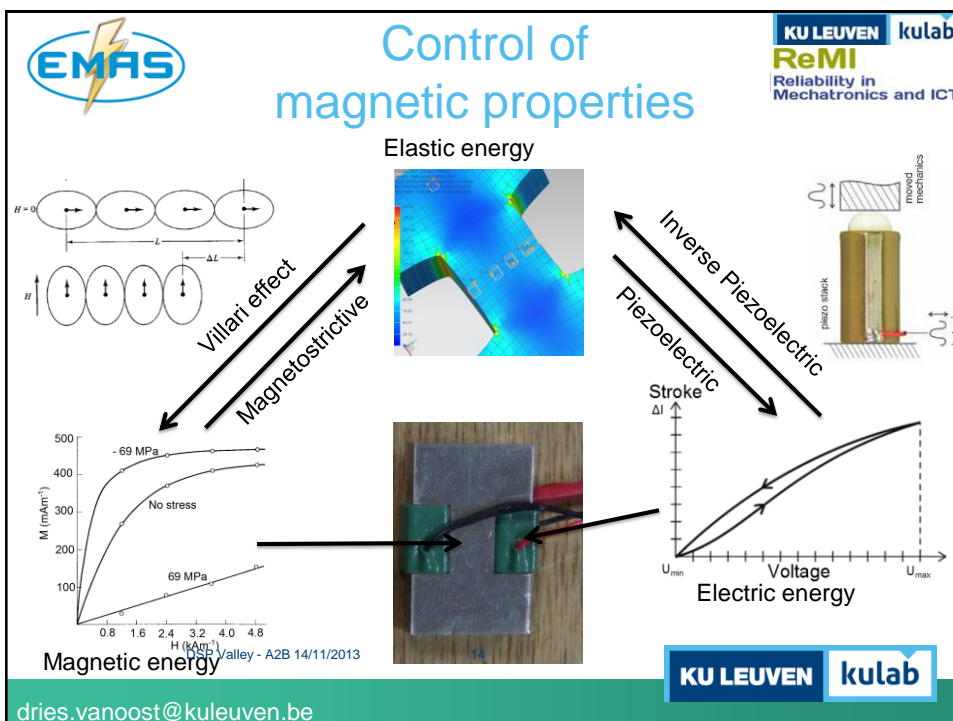
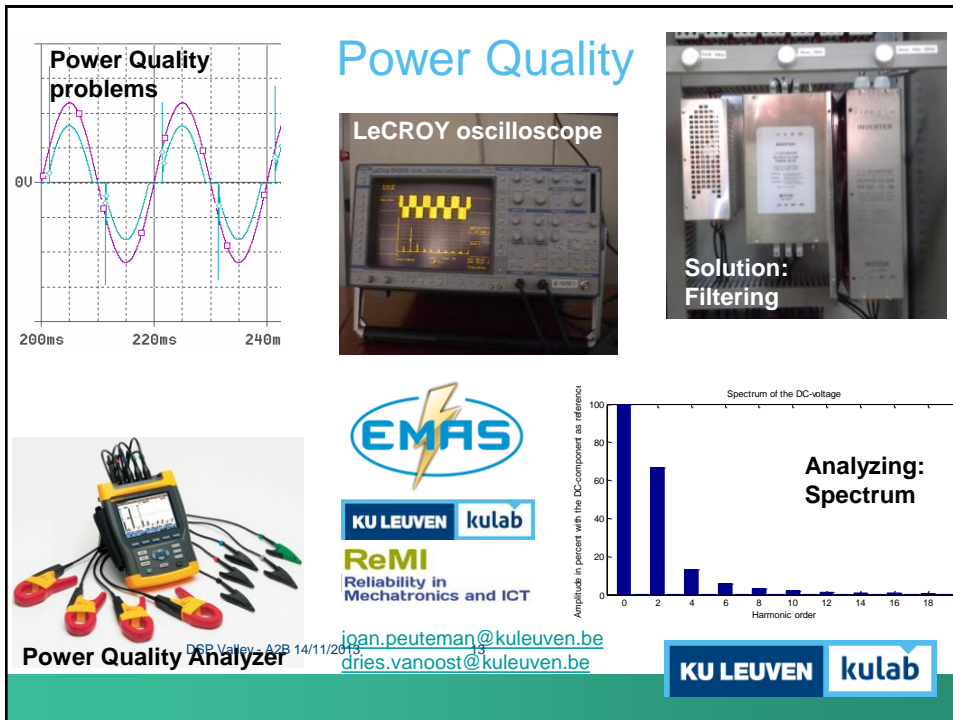


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Research project **proposal**: Multimodal Sensors for Food Intake Activity Monitoring

- Elderly population
 - 12% suffers from malnutrition
 - detrimental effect of physical and mental health
 - high priority for self-empowerment
- Monitoring activity of daily living (ADL) for food intake activity
 - Provide feedback to health care provider and elderly
 - Empower the elderly to stimulate food intake
- Goal
 - build a monitoring system for ADL - food intake
 - provide technology for follow-up projects for validation in larger populations
 - IWT- Tetra funding



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